Rostrum and palpi brown; scape of antenna light yellowish-brown, the basal segment slightly darker than the second segment; flagellum broken. Front, vertex and occiput dark-colored, thickly bluish-grey pruinose. Frontal tubercle prominent, not notched.

Mesonotum yellowish-brown, shiny, a narrow deep brown line on either side of the broad dorsal median portion, beginning above the pseudosutural region, narrowing behind and ending before the transverse suture; a large rounded brown spot on the sides of the sclerite before the transverse suture; scutum, scutellum and postnotum yellowish-brown with a faint greyish bloom; a rounded darker brown spot on the lateral lobes of the latter. Pleuræ very light yellow, a large rounded brown spot on the mesopleuræ underneath the wing-root and less distinct spots on the propleuræ and cervical sclerites forming an interrupted dorso-pleural band. Halteres deep brown. Legs: coxæ and trochanters light yellow; femora yellowish-brown, extreme tip darker brown; tibiæ brown; fore metatarsus brown on basal two-fifths, remaining portions of fore tarsi pure white except the last segment which is brownish; middle leg, with the basal third of the metatarsus brown; metatarsus of the hind legs entirely white. Wings: subhyaline or slightly tinged with darker, especially toward the tip; veins dark brown. Venation, see figure 2.

Abdominal tergum with the segments dark brown; segment 1 pallid at base, darker apically; extreme margin of segments 2–6 pallid; 7–8, not pale at tip; ♂ hypopygium reddish-brown; sternites dull yellow.

Holotype, ♂. Patalue, Guatemala, Central America. 700 ft. (Dr. G. Eisen.) Allotype, ♀, with the type. Received at the National Museum, January 6, 1903. Type in U. S. Nat. Mus. Coll.; allotype in author's collection.

EXPLANATION OF PLATE IV.

The figures are all drawn to scale by means of a projection microscope.

Fig. 1. *Eriocera kaieturensis* sp. nov.; wing.
Fig. 2. *Penthoptera conjuncta* sp. nov.; wing.
Fig. 3. *Eriocera cornigera* sp. nov.; wing.
Fig. 4. *Eriocera macrocera* sp. nov.; wing.
Fig. 5. *Eriocera peruviana* sp. nov.; wing.
Fig. 6. *Eriocera longistyla* Alex; wing.
Fig. 7. *Eriocera magnifica* sp. nov.; wing.
Fig. 8. *Eriocera perpulchra* sp. nov.; wing.

THERMAL CONDUCTIVITY OF COCOONS.

By Harry B. Weiss,
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With a view toward determining the value of cocoons as a protection against extremes of temperature, thermometric tests of those of quite a number of species were made in the following manner: Normal empty cocoons were selected and the bulbs of thermometers placed inside so as to occupy as nearly as possible the positions of the pupæ, that is, care was taken to have an air space surrounding each bulb. Each cocoon was fastened in place by elastic bands and then glued or sealed with wax.

The following tables show three different sets of conditions: one under normal field temperatures, one where a gradual rise takes place effected by placing the cocoon in an electric oven, and the other where a sudden drop occurs. The average length of time for the temperature of the inside of the cocoon to reach that of the surrounding atmosphere during a rise and fall was almost three quarters of an hour.

Cocoon of *Telea polyphemus*.

Field Conditions.

Outside temperature.	Temperature inside cocoon.
10°C.	15°C
8°	12°
7°	10°

Gradual Rise.

Surrounding temperature.	Time.	Temperature inside cocoon.
48°C.	0 min.	48° C.
51°	10 "	48°
55°	20 "	54°
57°	25 "	55°
60°	30 "	57°
61°	35 "	59°
62°	40 "	62°

Sudden Drop.

Surrounding temperature.	Time.	Temperature inside cocoon.
10°C.	0 min.	14°C.
2°	5 "	14°
0°	15 "	10°
0°	25 "	6°
0°	35 "	4°

Cocoon of *Bombyx mori*.

Field Conditions.

Outside temperature.	Temperature inside cocoon.
10°C.	15°C
9°	12°
7°	11°

Gradual Rise.

Surrounding temperature.	Time.	Temperature inside cocoon.
20°C.	0 min.	26°C.
44°	10 "	37°
61°	20 "	54°
66°	30 "	58°
68°	40 "	64°
75°	50 "	75°

Sudden Drop.

Surrounding temperature.	Time.	Temperature inside cocoon.
10°C.	0 min.	14°C.
0°	5 "	14°
0°	15 "	10°
0°	25 "	8°
0°	35 "	5°

Bag of *Thyridopteryx ephemeræformis.*

Field Conditions.

Outside temperature.	Temperature inside bag.
8°C.	13°C.
7°	11°
7°	7°

Gradual Rise.

Surrounding temperature	Time.	Temperature inside bag.
26°C.	0 min.	26°C.
38°	10 "	29°
48°	20 "	42°
50°	25 "	43°
53	30 "	48°
55°	35 "	52°
56°	40 "	53°

Sudden Drop.

Surrounding temperature.	Time.	Temperature inside bag.
10°C.	0 min.	26°C.
0°	5 "	25°
0°	15 "	13°
0°	25 "	5°
0°	35 "	3°

Cocoons of *Callosamia promethea* and *Tropœa luna* gave similar results. In spite of errors due to imperfect conditions, these tables show that the temperature inside a cocoon is practically the same as that of the surrounding air and that there is a constant tendency for the inside temperature to approach that of its surroundings.

One fact, however, which is readily apparent, is that sudden changes of temperature do not occur within the cocoon. When the outside temperature was suddenly lowered as from 10°C. to 0°C., the temperatures in the cocoons fell gradually and even during a gradual rise, the cocoon temperature lagged behind that of its surroundings. This is no doubt due to the poor conducting qualities of air and silk.

As the cocoon of *Samia cecropia* is double and the pupa thereby protected by two air spaces, this was somewhat more resistant to sudden changes of temperature than the others, a longer time being required for the inside temperature to reach that of the atmosphere, when either a rise or fall occurred.

From figures showing comparative conductivity[1] one can see that air is extremely poor conductor, and also wool, the thermal conductivity of which approaches that of silk, the exact figures for silk being unobtainable. It is worth noting that the rather thin paper-like covering of the bag worm was equally as resistant to sudden changes, as the well made heavier cocoons of *Bombyx mori* and *Callosamia promethea*.

From the standpoint of temperature alone it is doubtful if the pupa needs the protection afforded by a thick cocoon, especially when we consider that pupæ of the superfamily Papilionoidea are without such coverings.

From the standpoint, of moisture however, it is exceedingly necessary for the insect to have such a covering, especially if the pupal stage is passed on the ground among leaves or in situations likely to be moist.

Cocoons of *Callosamia promethea*, the layers of which tend to fray out toward the proximal ends, which are not finished inside with coatings similar to the remainder of the interiors, when partly

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[1] The conductivities for heat of a number of substances is as follows: Copper, 1.041, Iron 0.167, Ice 0.0057, Marble 0.005, Glass 0.0025, Cork 0.0007, Wool 0.00012, Paper 0.000094, Air 0.000056.

submerged in water for seven hours, showed interiors perfectly dry, the water having penetrated only the outer layer. Those partly submerged in alcohol and sulphuric acid for the same time were wet clear through, the acid having softened the entire mass. Alcohol penetrated easily but did not have the disintegrating action of the acid. When totally submerged in the above liquids for one hour, the acid and alcohol readily entered the proximal end from which the moth escapes and also penetrated the sides, but water was effectually kept out, the fringe-like ends of the layers being bunched together sufficiently for that purpose, and the pressure of the air inside the cocoon undoubtedly helping also.

It is a generally accepted fact that the interiors of cocoons are coated all over with a gummy resinous substance, also that the emergence is usually effected by a fluid secreted by the insect, which has the property of softening the threads and gum.

The following paragraphs from Trouvelot explain how this is accomplished:

"*T. polyphemus* is provided with two glands opening into the mouth, which secrete during the last few days of the pupa state, a fluid which is a dissolvent for the gum so firmly uniting the fibres of the cocoon.

"This liquid is composed in great part of bombycic acid. When the insect has accomplished the work of transformation, which is going on under the pupa skin, it manifests a great activity, and soon the chrysalis covering bursts open longitudinally upon the thorax; the head and legs are soon disengaged, and the acid flows from its mouth, wetting the inside of the cocoon. The process of exclusion from the cocoon lasts for as much as half an hour. The insect seems to be instinctively aware that some time is required to dissolve the gum, as it does not make any attempt to open the the fibres and seems to wait with patience this event. When the liquid has fully penetrated the cocoon, the pupa contracts its body, and pressing the hinder end, which is furnished with little hooks against the inside of the cocoon, forcibly extends its body; at the same time the head pushes hard upon the fibres and a little swelling is observed on the outside.

"These contractions and extensions of the body are repeated many times and more fluid is added to soften the gum, until under these efforts the cocoon swells and finally the fibres separate, and out comes the head of the moth. In an instant the legs are thrust out, and then the whole body appears; not a fibre has been broken, they have only been separated."

The cocoons of *Samia cecropia* and *Callosamia promethea* do not have a gummy coating over the entire interior. In each case the end through which the moth emerges is composed of silken fibres loosely pulled together and not covered with a gummy substance. It is as if each layer of the cocoon was spun into a fringe at this end, the fringes of all layers being bunched together forming a little cone. In the cocoon of *Samia cecropia*, it was possible to push a pencil through this fringe with apparently no effort. The fibres parted readily, it being necessary to break only a few in the extreme outside layer. The same can be said of *C. promethea's* cocoon.

This condition of affairs evidently enables the emerging insect to escape, without the aid of secretions or cutting apparatus, the struggles evidently helping considerably to enlarge the opening. It is rather strange how few text-books on entomology mention this method of emergence.

SITOWSKI'S NEW ABERRATION OF *COLIAS HYALE* L.

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In the *Bulletin de L'Academie des Sciences de Cracovie* for May, 1913, L. Sitowski figures and describes an aberrant form of *Colias hyale* L. to which he gives the name *polonica*. The example, a male, was taken at Radlow in Galizia and appears to be different from any of the forms hitherto described. Besides minor differences of color distinguishing the aberration from the parental form, there is a great extension of the dark border on the upper side of the primaries into the disk, and an entire absence of the border on the upper side of the secondaries. A suffusion of dark scales over the light areas distinguishes the under sides of the wings from the type.

The scales of the wings are strikingly different from the normal, lacking altogether the apical processes and being smoothly rounded off instead. The scent-scales at the bases of the hind wings